Replaced by Orticle 34 PCT/US2003/040872 PJS 47-61

What is claimed is:

- 1. A method to achieve direct adhesion between an adhesive activated textile reinforcing material and an activated rubber comprising the steps of
- (A) applying an topcoat composition to the textile reinforcing material;
- (B) fixing the topcoat composition to the material obtained from step (A);
- (C) embedding the material from step (B) in the rubber; and
- (D) curing the rubber containing the textile reinforcing material obtained from step (C) at a temperature and for a time sufficient to cure said rubber.
- 2. The method of claim 1 wherein the textile reinforcing material is selected from the group consisting of polyester, rayon, polyamide and aramid.
- 3. The method of claim 1 wherein the textile reinforcing material is polyester.
- 4. The method of claim 1 wherein the topcoat composition comprises
- (i) at least one hydroxyl aromatic compound having at least two hydroxyl groups, or a phenolic resin compound obtainable from a hydroxyl aromatic compound having at least one hydroxyl group; and
- (ii) at least one diene polymer.
- 5. The method according to claim 1, wherein the topcoat composition is dissolved in a suitable solvent and applied to the textile reinforcing material.
- 6. The method of claim 5, wherein the suitable solvent comprises water.

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- 7. The method of claim 4, wherein the phenolic resin compound is chosen from the group comprising condensation products of the hydroxyl aromatic compounds condensed with an aldehyde or a ketone with an aldehyde/ketone to hydroxyl aromatic compound molar ratio of less than 1.0.
- 8. The method of claim 4, wherein the diene polymer is present in the topcoat composition in the form of a latex.
- 9. The method of claim 1, wherein the topcoat composition is fixed to said textile reinforcing material by exposure to a temperature in the range of from about 20°C to about 250°C, preferably from about 110°C to 240°C, most preferably from about 215°C to 235°C.
- 10. The method of claim 1, wherein the rubber is selected from the group consisting of diene rubbers, diene/alpha-olefin rubbers, ethylene/propylene rubbers and ethylene/alpha-olefin/diene rubbers.
- 11. The method of claim 1, wherein the rubber is cured at a temperature of from about 140°C to 220°C, preferably from about 160°C to 200°C, most preferably from about 170°C to 180°C.
- 12. The method of claim 1, wherein the topcoat composition as applied comprises
- (i) a phenolic resin compound obtainable by the reaction of a hydroxyl aromatic compound (R) with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms with an aldehyde containing between about 1 and about 12 carbon atoms, preferably between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) at a F/R molar ratio of less than 1.0; and



(ii) a diene latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 13. The method of claim 1, wherein the topcoat composition as applied comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of resorcinol (R) with formaldehyde (F) at a F/R molar ratio of less than 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 14. The method of claim 12 or 13, wherein the F/R molar ratio is in the range of about 0.2 to about 0.9, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 15. The method of claim 1, wherein the topcoat composition as applied comprises
- (i) a phenolic resin compound obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate with a hydroxyl aromatic compound with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms and then reacting the resulting product (R) with an aldehyde containing between about 1 and about 12 carbon atoms, preferably between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) and solubilizing the resulting product in an aqueous basic solution at a F/R molar ratio of less than 1.0; and

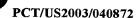
(ii) a diene latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 16. The method of claim 1, wherein the topcoat composition as applied comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate and resorcinol (R), then reacting the resulting product with formaldehyde (F) and solubilizing it in an aqueous basic solution with a F/R molar ratio of less than 1; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 17. The method of claim 15 or 16, wherein the F/R molar ratio is in the range of about 0.2 to about 0.7, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 18. The method of claim 1, wherein the topcoat is present in an amount of from about 0.1 to about 3 % by weight, preferably from about 0.2 to about 2 % by weight, and most preferably from about 0.4 to about 1.5 % by weight, based on the weight of the dry coated textile reinforcing material.
- 19. The method of claim 1, wherein the textile reinforcing material is selected from the group consisting of filaments, yarns, cords, fabrics, films, tapes and any combination thereof.

- 20. The method of claim 1, wherein the topcoat composition is applied to the textile reinforcing material during the process of making the textile reinforcing material.
- 21. The method of claim 1, wherein the rubber contains an RF-adhesion system of resorcinol and resorcinol-formaldehyde precondensate, a methylene donor and active silica.
- 22. An topcoat composition for imparting adhesion to textile reinforcing materials said composition comprising
- (i) at least one hydroxyl aromatic compound having at least two hydroxyl groups, or a phenolic resin compound obtainable from a hydroxyl aromatic compound having at least one hydroxyl group; and
- (ii) at least one diene polymer.
- 23. The topcoat composition of claim 22 being aqueous.
- 24. The topcoat composition of claim 22 wherein the phenolic resin compound is chosen from the group comprising condensation products of the hydroxyl aromatic compounds condensed with an aldehyde or a ketone with an aldehyde/ketone to hydroxyl aromatic compound molar ratio of less than about 1.0.
- 25. The topcoat composition of claim 22 wherein the diene polymer is present in the topcoat composition in the form of a latex.
- 26. The topcoat composition of claim 22, wherein the topcoat composition comprises
- (i) a phenolic resin compound obtainable by the reaction of a hydroxyl aromatic



compound (R) with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms with an aldehyde containing between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) at a F/R molar ratio of less than 1.0; and

(ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 27. The topcoat composition of claim 22, wherein the topcoat composition comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of resorcinol (R) with formaldehyde (F) at a F/R molar ratio of less than about 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 28. The topcoat composition of claim 26 or 27, wherein the F/R molar ratio is in the range of about 0.2 to about 0.9, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 29. The topcoat composition of claim 22, wherein the adhesive topcoat composition comprises
- (i) a phenolic resin compound obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate with a hydroxyl aromatic compound with 2 or more aromatic



hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms and then reacting the resulting product (R) with an aldehyde containing between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) and solubilizing the resulting product in an aqueous basic solution at a F/R molar ratio of less than 1.0; and

(ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 30. The topcoat composition of claim 22, wherein the adhesive topcoat composition comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate and resorcinol, then reacting the resulting product with formaldehyde and solubilizing it in an aqueous basic solution with a F/R molar ratio of less than about 1; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 31. The topcoat composition of claim 29 or 30, wherein the F/R molar ratio is in the range of about 0.2 to about 0.7, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 32. An activated textile reinforcing material obtainable by a method comprising the

steps of

- (A) applying a topcoat composition to a textile reinforcing material; and
- (B) fixing the topcoat composition to the material obtained from step (A).
- 33. The material of claim 32 wherein the textile reinforcing material is selected from the group of polyester, rayon, polyamide and aramid.
- 34. The material of claim 32 wherein the textile reinforcing material is polyester.
- 35. The material of claim 32, wherein the topcoat composition is dissolved in a suitable solvent and applied to the textile reinforcing material.
- 36. The material of claim 35, wherein the suitable solvent comprises water.
- 37. The material of claim 32, wherein the textile reinforcing material is selected from the group consisting of filaments, yarns, cords, fabrics, films, tapes, and any combination thereof.
- 38. The material of claim 32, wherein the topcoat composition is applied to the textile reinforcing material during the process of making the textile reinforcing material.
- 39. The material of claim 32 wherein the topcoat composition comprises
- (i) at least one hydroxyl aromatic compound having at least two hydroxyl groups, or a phenolic resin compound obtainable from a hydroxyl aromatic compound having at least one hydroxyl group; and
- (ii) at least one diene polymer.

- 40. The material of claim 32 wherein the topcoat composition is an aqueous composition.
- 41. The material of claim 32 wherein, after having applied the topcoat to the textile reinforcing material, the topcoated textile reinforcing material is exposed to a temperature in the range of from about 20°C to about 250°C, preferably from about 110°C to 240°C, most preferably from about 215°C to 235°C.
- 42. The material of claim 32 wherein the topcoat composition comprises
- (i) a phenolic resin compound obtainable by the reaction of a hydroxyl aromatic compound (R) with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms with an aldehyde containing between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) at a F/R molar ratio of less than 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 43. The material of claim 32 wherein the topcoat composition comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction resorcinol (R) with formaldehyde (F) at a F/R molar ratio of less than about 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,



wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 44. The material of claim 42 or 43, wherein the F/R molar ratio of the resin is in the range of about 0.2 to about 0.9, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 45. The material of claim 32 wherein the topcoat composition comprises
- (i) a phenolic resin compound obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate with a hydroxyl aromatic compound with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms and then reacting the resulting product (R) with an aldehyde containing between about 1 and about 12 carbon atoms, preferably between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) and solubilizing the resulting product in an aqueous basic solution at a F/R molar ratio of less than 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

- 46. The material of claim 32 wherein the topcoat composition comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate and resorcinol (R), then reacting the resulting product with formaldehyde (F) and solubilizing it in an aqueous basic solution with a F/R molar ratio of less than about 1; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35

to 45 %, most preferably about 40 %,

- 47. The material of claim 45 or 46, wherein the F/R molar ratio of the resin is in the range of about 0.2 to about 0.7, preferably from about 0.3 to 0.6, and most preferably about 0.4.
- 48. The material of claim 32 wherein the topcoat composition is present in an amount of from about 0.1 to about 3 % by weight, preferably from about 0.2 to about 2 % by weight, and most preferably from about 0.4 to about 1.5 % by weight, based on the weight of the dry coated adhesive activated textile reinforcing material.
- 49. A reinforced rubber article obtainable by a method comprising the steps of
- (A) applying an topcoat composition to a textile reinforcing material;
- (B) fixing an topcoat composition to the material obtained from step (A);
- (C) embedding the material from step (B) in an activated rubber; and
- (D) curing the rubber containing the reinforcing material obtained from step (C) at a temperature and for a time sufficient to cure said rubber.
- 50. The article of claim 49 wherein the textile reinforcing material is selected from the group consisting of polyester, rayon, polyamide and aramid.
- 51. The article of claim 49 wherein the textile reinforcing material is polyester.
- 52. The article of claim 49 wherein the topcoat composition comprises

- (i) at least one hydroxyl aromatic compound having at least two hydroxyl groups, or a phenolic resin compound obtainable from a hydroxyl aromatic compound having at least one hydroxyl group; and
- (ii) at least one diene polymer.
- 53. The article according to claim 49, wherein the topcoat composition is dissolved in a suitable solvent and applied to the textile reinforcing material.
- 54. The article of claim 53, wherein the suitable solvent comprises water.
- 55. The article of claim 52, wherein the phenolic resin compound is chosen from the group comprising condensation products of the hydroxyl aromatic compounds condensed with an aldehyde or a ketone with an aldehyde/ketone to hydroxyl aromatic compound molar ratio of less than about 1.0.
- 56. The article of claim 42, wherein the diene polymer is present in the topcoat in the form of a latex.
- 57. The article of claim 49, wherein the topcoat composition is fixed to said textile reinforcing material by exposure to a temperature in the range of from about 20°C to about 250°C, preferably from about 110°C to 240°C, most preferably from about 215°C to 235°C.
- 58. The article of claim 49, wherein the rubber is selected from the group consisting of diene rubbers, diene/alpha-olefin rubbers, ethylene/propylene rubbers and ethylene/alpha-olefin/diene rubbers.



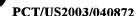
- 59. The article of claim 49, wherein the rubber is cured at a temperature of from about 140°C to 220°C, preferably from about 160°C to 200°C, most preferably from about 170°C to 180°C.
- 60. The article of claim 49, wherein the topcoat composition applied comprises
- (i) a phenolic resin compound obtainable by the reaction of a hydroxyl aromatic compound (R) with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms with an aldehyde containing between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) at a F/R molar ratio of less than 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 61. The article of claim 49, wherein the topcoat composition applied comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of resorcinol (R) with formaldehyde (F) at a F/R molar ratio of less than about 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

62. The article of claim 60 or 61, wherein the F/R molar ratio is in the range of about



0.2 to about 0.9, preferably from about 0.3 to 0.6, and most preferably about 0.4.

- 63. The article of claim 49, wherein the topcoat composition applied comprises
- (i) a phenolic resin compound obtainable by the reaction of triallyl cyanurate and/or triallyl isocyanurate with a hydroxyl aromatic compound with 2 or more aromatic hydroxyl groups containing between about 5, preferably 6 and 14, preferably 10 carbon atoms and then reacting the resulting product (R) with an aldehyde containing between about 1 and about 7 carbon atoms or a ketone containing between about 3 and about 8 or about 13 carbon atoms, preferably between about 3 and about 6 carbon atoms (F) and solubilizing the resulting product in an aqueous basic solution at a F/R molar ratio of less than 1.0; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

- 64. The article of claim 49, wherein the topcoat composition applied comprises
- (i) a phenolic resin compound having a solids content from about 10 to about 100 %, preferably from about 15 to about 80 %, most preferably from about 20 % obtainable by the reaction of triallyl cyanurate and/or triallyl cyanurate and resorcinol (R), then reacting the resulting product with formaldehyde (F) and solubilizing it in an aqueous basic solution with a F/R molar ratio of less than about 1; and
- (ii) a latex having a solids content from about 30 to about 50 %, preferably about 35 to 45 %, most preferably about 40 %,

wherein the dry weight-ratio of resin (i) to latex (ii) is from about 50/50 to about 80/20, based on the total dry weight of (i) and (ii).

65. The article of claim 63 or 64, wherein the F/R molar ratio is in the range of about



0.2 to about 0.7, preferably from about 0.3 to 0.6, and most preferably about 0.4.

- 66. The article of claim 49, wherein the topcoat is present in an amount of from about 0.1 to about 3 % by weight, preferably from about 0.2 to about 2 % by weight, and most preferably from about 0.4 to about 1.5 % by weight, based on the weight of the dry coated textile reinforcing material.
- 67. The article of claim 49, wherein the textile reinforcing material is selected from the group consisting of filaments, yarns, cords, fabrics, films, tapes, and any combination thereof.
- 68. The article of claim 49, wherein the topcoat composition is applied to the textile reinforcing material during the process of making the textile reinforcing material.
- 69. The article of claim 49, having improved dynamic fatigue properties.
- 70. A tire, hose, V-belt or conveyor belt obtainable from the article of anyone of claims 49 to 69.